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# NATURAL RESOURCE STUDIES

## A. PROGRAM RATIONALE AND PHILOSOPHY

The Natural Resource Studies curriculum focuses attention on the collective physical and biological features of our environment. These features are subject to the actions of human kind, and are undergoing rapid transformation. Collectively, the actions of human kind are straining the ability of the earth's systems to maintain themselves in balance. Natural Resource Studies will help students to understand the importance of their relationship with the environment. Throughout the program, students will be encouraged to develop a commitment to the responsible use of natural resources and the preservation of water, land, air, forests and wildlife.

Development of our natural resources encompasses areas of production, processing, marketing, exploration and research. Applications of science and technology are necessary for effective practice within these areas. Responsible management of natural resources will enable society to meet its present needs without compromising the ability of future generations to meet their needs. The Natural Resource Studies curriculum provides for a balance among these perspectives, and examines scientific, ethical, political, and economic issues impacting our use of renewable and non-renewable resources.

Although students are at various stages of cognitive development, many will continue to use concrete operational thinking. Each course in Natural Resource Studies provides opportunities for students to link concrete and psychomotor learning experiences to more abstract thought processes and levels of thinking. Students will be encouraged to transfer the competencies they have developed in other core and complementary school courses as well as through hobbies, interests and past experiences. As students learn to relate theory and practice in a variety of relevant situations, confidence will further their ability to meet the challenges of personal life, work life and further education.

Students are in the process of exploring career options as they move through adolescence toward independence and adult responsibilities. In view of the frequent career changes that students can expect to experience, students need to possess the skills and flexibility to adapt quickly to new situations. Future jobs will require that students are lifelong learners, and able to access information and technology as an aid to solving problems and making decisions. Within these contexts, the Natural Resource Studies curriculum focuses attention on the development of basic, transferable and career-specific knowledge, skills and attitudes that will assist students to:

- become responsible citizens and develop further understanding of the world in which they live

- appreciate career opportunities in natural resources and the preparation needed to enter and progress in related fields

- develop confidence and flexibility as they assume adult roles and move into the workplace and further education programs.

Introductory-level courses within Natural Resource Studies encourage exploration and establish a foundation of knowledge, skills and attitudes. Learning activities begin at a concrete level, and help students to understand the environment in a personal way. Intermediate- and advanced-level courses emphasize preparation and empowerment, and provide opportunities for students to develop more specialized knowledge, skills and behaviours relevant to careers in natural resources or further education and training.

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## B. GENERAL LEARNER EXPECTATIONS

Students will:

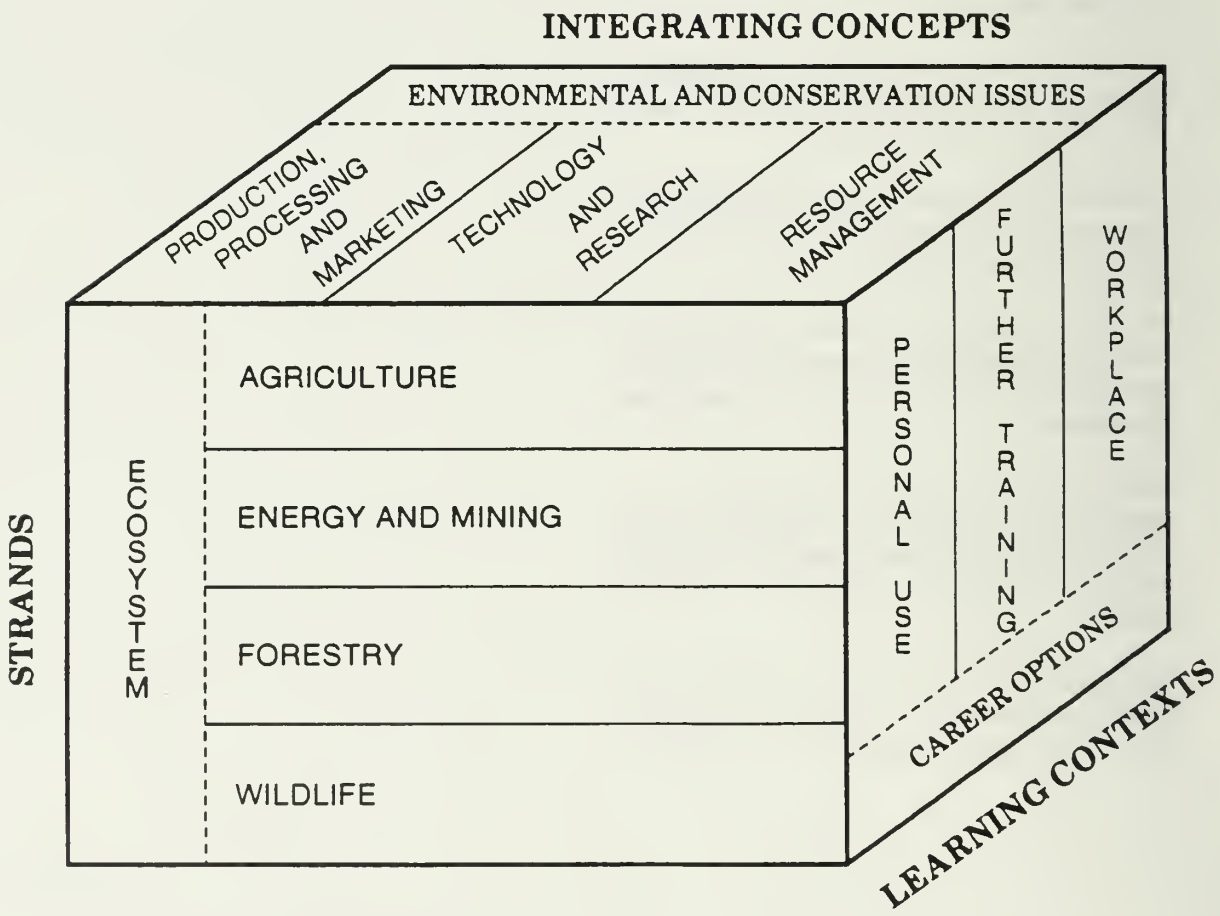
- develop awareness of the impact of natural resources on the social, economic, and environmental well-being of Alberta and the rest of the world, and the impact of human activity in Alberta and the rest of the world on ecosystems and the environment
- develop commitment to the preservation of water, land, air, forests and wildlife
- develop an understanding of the roles and responsibilities of individuals, industry and government in managing natural resources
- consider local, provincial and national policies and programs affecting the development and use of natural resources, and the impact of these policies and programs on other parts of the world
- identify relationships among producers, processors, marketers and consumers of natural resources
- develop awareness of past, present and emerging technologies, and ability to use technology in its various forms
- consider the benefits and limitations of science and technology in providing products and services for society
- develop critical and creative thinking skills and apply these skills, through a problem-solving process, to a variety of practical situations
- identify strategies for managing natural resources that enable society to meet its present needs without compromising the ability of future generations to met their needs
- assess personal interests, abilities and aptitudes relevant to making realistic and satisfying career choices
- develop knowledge, skills and attitudes that have broad career applications in the world of work and specific applications to natural resources and the environment
- develop a more positive self-concept and increased understanding of personal interests, values, aptitudes and abilities, so as to enter the world of work or further education programs with increased confidence and success.

# C. STATEMENT OF CONTENT

## PROGRAM FRAMEWORK

The model depicts major emphases within the Natural Resource Studies program. Three dimensions that provide a basis for selecting and organizing content are represented in the model.

- The INTEGRATING CONCEPTS, represented on the upper face of the model, provide structure for the program and address learning outcomes common to each strand.
- The LEARNING CONTEXTS, represented on the right face of the model, foster the development of knowledge and behaviours that will enable students to meet the demands of daily living, further training and the workplace.
- The STRANDS provide situational and concrete learning experiences where knowledge, skills and attitudes that relate to the integrating concepts and learning contexts are linked. Each strand focuses on an area of activity within Alberta's natural resources.



## DELIVERY STRATEGIES

The Natural Resource Studies curriculum will foster experiential learning and the application of knowledge, skills and attitudes in real life situations. Students will be given opportunities to participate in a wide range of activities within the classroom and their local community. Activities may include discussions, simulations, surveys, business ventures, field trips, laboratory projects, work experience and job observations.

Cooperative education experiences will provide students with work-related experience and some vocational training. Cooperative education enriches the teaching and learning that takes place within the classroom. These experiences are essential, and help students manage the transition from school to the workplace more effectively. Cooperative education provides opportunities for students to gain experience in the workplace through work experience, work study and job shadowing. Students will have opportunities to explore a variety of work roles and possible career choices.

Activities suggested throughout the Natural Resource Studies program will provide opportunities for students to:

- apply knowledge, skills and attitudes of other disciplines in contexts relevant to self, society and the environment
- develop daily living and career skills including problem solving, decision making, communication, human relations, responsibility, enterprise and innovation
- develop a cooperative teamwork philosophy through group and class activities
- develop the abilities needed to exercise and follow effective leadership in fulfilling occupational, social and community responsibilities
- link the development of personal knowledge, skills and attitudes directly with workplace experience
- use industry and research partnerships to develop career aptitudes in realistic work settings.

## CURRICULUM SCOPE AND SEQUENCE

Preliminary plans will see the Natural Resource Studies curriculum structured around four strands: Agriculture; Energy and Mineral Resources; Forestry; Wildlife. Each strand will consist of introductory-, intermediate- and/or advanced-level modules. Introductory modules will encourage exploration and establish a foundation of knowledge and skills. These modules will provide opportunities for students to develop awareness, insights and broad understandings related to our use of natural resources. Intermediate and advanced modules will focus on preparation and empowerment. These modules will provide opportunities for students to develop more specialized knowledge, skills and behaviours relevant to careers in natural resources or further education and training.

### Agriculture

Agriculture is a diverse endeavour involving the transfer of food around the world. It impacts the quality of life enjoyed by all Albertans. Modules within the agriculture strand will focus attention on consumer needs regarding agricultural products and marketing systems, and the importance of local, provincial, national and international agriculture to people and the economy. Students will investigate issues regarding food supply, safety and quality, and study agriculture as an applied science in plant and animal products.

Introductory modules will encourage students to develop an awareness of the impact of agriculture on their personal lives and local communities, and how consumer choices and decisions can influence agricultural practices. Students will investigate the production, processing and marketing principles involved in bringing food (e.g., a glass of milk, slice of bread or piece of meat) to their tables, and issues regarding the sustainability of local agricultural resources. Modules will provide opportunities for students to:

- study sample areas of agricultural production, processing and marketing
- examine various technologies that support effective agricultural practice
- consider the environmental and social impacts of water, soil and land use practices.

Intermediate and advanced modules will focus the curriculum toward agrimarketing, and develop more specialized knowledge and skills related to the management, production, supervision and sale of food and other agricultural commodities. These modules will encourage students to consider the role of agriculture in a global economy, and current impacts of technology and society on the agricultural enterprise. Students will examine relationships that exist among factors such as finance, foreign policy, international trade, technology, environmental issues and the agriculture industry.

Potential areas of specialization for students choosing to study intermediate- and advanced-level modules include:

Food and Speciality Crops. (i.e., the production, processing and marketing of crops for food, feed and fibre; includes large and small acreage operations, greenhouse and nursery production, processing techniques, marketing policies and alternatives.)

Animal Science. (i.e., the production, processing and marketing of animals and animal products; includes intensive and field-based operations, processing techniques, marketing policies and alternatives.)

Intensive Plant Culture. (i.e., the production, processing and marketing of plants for aesthetic and recreational purposes; includes greenhouse and nursery production, landscaping and interiorscaping, floristry, marketing alternatives.)

Supplies and Services. (i.e., the mechanical practices associated with agricultural enterprises; includes operation and maintenance of equipment, sale of equipment and supplies, construction of facilities, transportation of products and supplies.)

### Energy and Mineral Resources

Decisions regarding the development and use of energy and mineral resources have significant impact on our daily lives. Modules within this strand will focus attention on the development of renewable and non-renewable energy sources, as well as metallic, industrial and other mineral resources. Students will examine their use of these resources in daily living, develop knowledge of energy alternatives and energy systems, and consider issues regarding supply, conservation and management.

Introductory modules will encourage students to develop an awareness of their dependence on energy resources, and how conservation practices and development of renewable energy sources will help ensure a sustainable energy future. Students will consider the impact of everyday decisions on resource consumption and environmental quality, and develop a problem-solving process for analyzing related issues. Modules will provide opportunities for students to:

- study sample areas in the production, processing and marketing of energy and mineral resources
- examine various technologies and research programs that support sustainable development and efficient use of natural resources
- consider environmental and economic issues related to our use of energy and mineral resources.

Intermediate and advanced modules will develop more specialized knowledge and skills regarding the production, processing and marketing of energy and mineral resources. Students will investigate related technologies and examine elements of efficiency and conservation in familiar energy systems. These modules will provide opportunities for students to explore career paths within Alberta's energy and mineral industries.

Potential areas of specialization for students choosing to study intermediate- and advanced-level modules include:

Renewable Energy Resources. (i.e., the development of solar, geothermal, biomass, wind, hydro, tital and wave energy; deals with energetics and applications of technology in the production, distribution and conservation of energy; addresses environmental and economic perspectives influencing energy development.)

Non-Renewable Energy Resources. (i.e., the development of coal resources, petroleum resources and nuclear energy; deals with history and importance of non-renewable energy resources, basic geological processes, extraction and manufacturing technologies, energetics; addresses environmental and economic perspectives influencing energy development.)

Energy Systems. (i.e., the analysis of energy and heat systems used at home and in the work place; deals with energetics, co-generation, efficiency and conservation; addresses the use of problem-solving and design skills in constructing efficient energy systems.)

Mineral Resources. (i.e., the retrieval, processing and marketing of metallic, industrial and other mineral resources; deals with history and importance of these resources, basic geological processes, industrial and commercial applications; addresses environmental and economic perspectives influencing the recovery and use of these resources.)

**Forestry**

Forests are a valuable source of natural wealth and cover almost two-thirds of our province. The resources found on or beneath these public lands are important to the economic strength and quality of life in Alberta. Modules within the forestry strand will focus attention on the dynamics of the forest ecosystem, as well as the diverse and sometimes competing needs associated with our use of forest lands. Students will explore the multiple use concept, and identify ways to ensure that Alberta's forested lands continue to support the growth of our forest products industry while at the same time provide fish and wildlife habitat, vital watersheds, grazing lands, non-renewable resource development sites and a variety of outdoor recreation and tourism opportunities.

Introductory modules will encourage students to develop an awareness of the impact of forested lands on their personal lives and local communities, and how human decisions and actions may influence the future of forests. Students will investigate the forest as a functioning ecosystem, the role played by forests in maintaining life, and management principles that will ensure forests provide a continuous supply of goods and benefits for all. Modules will provide opportunities for students to:

- study sample areas of endeavour related to Alberta's forest resources (e.g., a harvesting operation, a reforestation project, a recreational development)
- examine various technologies and research programs designed to support the endeavour
- consider impacts of the endeavour on our economic, environmental and recreational needs.

Intermediate and advanced modules will develop more specialized knowledge and skills related to forest management and the forest products industry. These modules will address concepts of sustainable development and enhanced yield, and focus attention on management practices designed to ensure that forests provide for recreational and environmental needs as well as sufficient timber for industrial purposes. Students will examine local management policies and programs, and develop a process for analyzing current issues in forestry.

Potential areas of specialization for students choosing to study intermediate- and advanced-level modules include:

Forest Resource Inventory. (i.e., taking stock of timber volumes, wildlife, soils, rangelands, watershed and recreation potential; deals with various survey techniques and computer-based planning and mapping systems used in forest management and woodlands operations.)

Forest Ecology. (i.e., the art and science of growing trees; includes principles of classification and plant growth, propagation techniques, stages of forest succession, reforestation, stand tending, and tree improvement programs.)

Forest Resource Protection. (i.e., equipment, technologies and proactive strategies used to detect and manage potential forest hazards; deals with the impact of wildfire, insects and disease on timber stands, wildlife, and the role of forests in water and soil conservation.)

Harvest and Use. (i.e., the harvesting and use of the timber crop; includes harvest methods and techniques, transportation, the processing and marketing of forest products, future forecasting and planning, and related issues of recreation, wildlife, water, air and soil quality.)

**Wildlife**

Conditions of wildlife habitat reflect the quality of the environment for all living things. We must strive to minimize the impacts of technology and human activity on natural systems. Modules within this strand will foster the development of lifestyle strategies that encourage living in harmony with others and the natural environment. Students will investigate ecology, the functioning of ecosystems, and the role of various management initiatives in protecting wildlife and habitat.

Introductory modules will focus attention on environmental knowledge and outdoor experiences. Students will examine the impact of human actions on natural systems, and consider how recreational pursuits may impact living and non-living factors in the environment. Modules will provide opportunities for students to:

- develop awareness and appreciation of living things and an understanding of basic ecological processes (i.e., food chains, bio-geo-chemical cycles, population regulation, pests and diseases)
- participate in a wide range of safe and environmentally responsible activities in outdoor settings
- develop lifestyle strategies that foster contact with the natural world and responsibility for local and global environments.

Intermediate and advanced modules will develop more specialized knowledge and skills related to the perceived necessity of stewardship of natural populations and areas. These modules will focus attention on management issues that require both personal and community action, and alternative solutions that are often complex and controversial. Students will investigate various wildlife and environmental management practices (e.g., monitoring, manipulating, regulating), and how these practices may have both positive and negative effects on different aspects of the environment.

Potential areas of specialization for students choosing to study intermediate- and advanced-level modules include:

Terrestrial. (i.e., the impacts of technology and human activity on wildlife and habitat in mountain, boreal, parkland and prairie regions; addresses endangered species and endangered spaces, monitoring and manipulation techniques, population trends, food chains, soil quality and air quality, current issues regarding land use.)

Aquatic. (i.e., the impacts of technology and human activity on wildlife and habitat in streams, rivers, lakes, wetlands, sloughs and bogs; addresses endangered species and endangered spaces, monitoring and manipulation techniques, population trends, food chains, water quality, current issues regarding water use and water management.)

Protected Areas. (i.e., current issues and trends related to the use of recreational, wilderness and natural areas; addresses outdoor survival skills, first aid and safety, responsible management techniques, recreational facility design.)

# AGRICULTURE
## Draft Scope and Sequence

| | *Introductory* (Foundation/Awareness) | *Intermediate* (Exploration/Specialization) | *Advanced* (Preparation/Empowerment) | |
|---|---|---|---|---|
| FOUNDATION | AGRICULTURE AND YOU | PRODUCTION, PROCESSING AND MARKETING CYCLES | GLOBAL ISSUES IN AGRICULTURE | |
| | AGRICULTURE AND THE CONSUMER | | | |
| EXPANSION | PRODUCTION, PROCESSING AND MARKETING SYSTEMS | INTEGRATED PEST MANAGEMENT | PRODUCTION OPERATIONS | Potential Linkages with other Programs: |
| | TECHNOLOGY AND RESEARCH | WATER, LAND AND SOIL | ENVIRONMENTAL CONSERVATION AND CONSEQUENCES | SMALL ENGINE MAINTENANCE |
| | RESOURCE CONSERVATION AND MANAGEMENT | PLANT AND ANIMAL NUTRITION | MARKETING PRINCIPLES AND APPLICATIONS | LANDSCAPE CONSTRUCTION |
| | | ANIMAL HUSBANDRY AND WELFARE | | FARM STRUCTURES AND MATERIALS HANDLING |
| | | CONTROLLED GROWING ENVIRONMENTS | GREENHOUSE OPERATIONS | |
| | | LANDSCAPE PRACTICES | LANDSCAPE DESIGN | |
| | | BASIC FLORAL DESIGN | RETAIL FLORICULTURE | |
| | | AGRI-FOOD INDUSTRIES I | AGRI-FOOD INDUSTRIES II | |
| | | BIOTECHNOLOGY I | BIOTECHNOLOGY II | |
| | | BASIC BUSINESS MANAGEMENT | ADVANCED BUSINESS MANAGEMENT | |

# ENERGY AND MINERAL RESOURCES
## Draft Scope and Sequence

| | *Introductory*<br>(Foundation/Awareness) | *Intermediate*<br>(Exploration/Specialization) | *Advanced*<br>(Preparation/Empowerment) |
|---|---|---|---|
| FOUNDATION | ENERGY EVERYDAY<br>(a focus on lifestyle and the role of energy and mineral products in our daily lives) | NON-RENEWABLE TECHNOLOGIES<br>(applications of non-renewable energy resources, including oil, natural gas and coal) | THE ENERGY-ENVIRONMENT CONNECTION<br>(developing an action plan for managing our energy resources) |
| | TAKING INVENTORY<br>(a survey of local energy and mineral reserves in relation to user demands) | RENEWABLE TECHNOLOGIES<br>(applications of renewable energy, with emphasis on wind energy and solar energy) | |
| | THE CONSERVATION CHALLENGE<br>(an introduction to environmental issues related to our use of energy and minerals) | | |
| EXPANSION | FUNDAMENTALS OF RECYCLING<br>(a focus on technologies used to recycle rubber, plastic and paper products) | MINERAL TECHNOLOGY<br>(applications of metallic and non-metallic minerals and structural materials) | ALTERNATIVE ENERGY PATHS<br>(a focus on strategies for integrating development and conservation) |
| | ENERGY FROM GARBAGE<br>(an investigation of systems used to generate energy from waste materials) | LOW ENERGY DESIGNS AND SYSTEMS I<br>(planning for efficient energy use at home and at work) | MARKETING TRENDS & ISSUES<br>(local and global issues that impact distribution and marketing of energy and minerals) |
| | | LOW ENERGY DESIGNS AND SYSTEMS II<br>(planning for efficient enorgy use in transportation) | FUELS FOR THE FUTURE<br>(a survey of research and case studies in the uso of renewablo onorgy sources) |
| | | BASIC TRAINING AND CERTIFICATION PROGRAMS | ADVANCED TRAINING AND CERTIFICATION PROGRAMS |

# WILDLIFE
## Draft Scope and Sequence

| | ***Introductory*** (Foundation/Awareness) | ***Intermediate*** (Exploration/Specialization) | ***Advanced*** (Preparation/Empowerment) |
|---|---|---|---|
| **FOUNDATION** | INTRODUCTION TO WILDLIFE (an introduction to wildlife and dynamic ecosystems) | MEASURING THE VALUE OF WILDLIFE (a focus on the economic and social significance of wildlife) | MANAGING THE WILDLIFE RESOURCE (a focus on opportunities for sustainable use) |
| **EXPANSION** | WHAT WILDLIFE MEANS TO ME (first-hand investigation of local environments and ecosystems) | WILDLIFE SPACES AND SPECIES (an in-depth investigation of selected spaces and species) | RESEARCH IN WILDLIFE (a survey of research techniques applied to case studies in wildlife management) |
| | ISSUES IN WILDLIFE I (an introduction to conflict resolution) | ISSUES IN WILDLIFE II (advanced studies in conflict resolution) | DEVELOPING A MANAGEMENT PLAN (developing an action plan for co-managing the wildlife resource) |
| | RECREATION, WILDLIFE AND ME (a focus on environmentally responsible activities in outdoor settings) | INTERACTIONS OF WILDLIFE AND SOCIETY (a focus on the interactions of wildlife with other land uses) | WILDLIFE MANAGEMENT AND ME (a focus on lifestyles and what "I" can do to make a difference) |

# FORESTRY
## Draft Scope and Sequence

| | *Introductory* (Foundation/Awareness) | *Intermediate* (Exploration/Specialization) | *Advanced* (Preparation/Empowerment) |
|---|---|---|---|
| FOUNDATION | FORESTS AND ME (the role of forest resources in our lives) | USERS IN THE FOREST (a focus on strategies for integrated land use) | MY FOREST: PLAYING THE GAME (developing an action plan for managing the forest resource) |
| | BASIC FOREST ECOLOGY (an introduction to dynamic forest ecosystems) | RULES OF THE GAME (an overview of policy and regulations governing forest use) | |
| | FORESTS FOREVER I (a focus on conservation and the wise use of forests) | | |
| EXPANSION | MEASURING THE FOREST I (an introduction to the techniques used to measure the forest resource) | FORESTS FOREVER II (a focus on sustainable development of forest resources) | MAKING A DIFFERENCE (a focus on lifestyles and personal stewardship) |
| | WOODSMANSHIP (an acclimatization to the forest resource) | MEASURING THE FOREST II (advanced techniques used to measure the forest resource) | ISSUES IN FORESTRY (a case study in conflict resolution) |
| | | ADVANCED FOREST ECOLOGY (an in-depth investigation of forest ecosystems) | CONSUMER TRENDS (the production, processing and marketing of forest products) |
| | | SILVICULTURAL SYSTEMS (the art and science of growing trees) | RESEARCH AND TECHNOLOGY (a focus on techniques for enhancing wood production and utilization) |

**PART D: CONGRUENCY WITH SPECIFIC AREA OF STUDY/STRAND**

Name of Resource: _____

Area of Study/Strand: **NATURAL RESOURCE STUDIES (Draft)**

In this resource, support for the learner expectations outlined is as follows:

| CURRICULUM | RESOURCE CORRELATION |
|---|---|
| **GENERAL LEARNER EXPECTATIONS**<br><br>Students will:<br><br>• develop awareness of the impact of natural resources on the social, economic, and environmental well-being of Alberta and the rest of the world, and the impact of human activity in Alberta and the rest of the world on ecosystems and the environment<br><br>• develop commitment to the preservation of water, land, air, forests and wildlife<br><br>• develop an understanding of the roles and responsibilities of individuals, industry and government in managing natural resources<br><br>• consider local, provincial and national policies and programs affecting the development and use of natural resources, and the impact of these policies and programs on other parts of the world<br><br>• identify relationships among producers, processors, marketers and consumers of natural resources<br><br>• develop awareness of past, present and emerging technologies, and ability to use technology in its various forms<br><br>• consider the benefits and limitations of science and technology in providing products and services for society<br><br>• develop critical and creative thinking skills and apply these skills, through a problem-solving process, to a variety of practical situations<br><br>• identify strategies for managing natural resources that enable society to meet its present needs without compromising the ability of future generations to met their needs | |

| CURRICULUM | RESOURCE CORRELATION |
|---|---|
| **GENERAL LEARNER EXPECTATIONS (continued)**<br><br>Students will:<br><br>• assess personal interests, abilities and aptitudes relevant to making realistic and satisfying career choices<br><br>• develop knowledge, skills and attitudes that have broad career applications in the world of work and specific applications to natural resources and the environment<br><br>• develop a more positive self-concept and increased understanding of personal interests, values, aptitudes and abilities, so as to enter the world of work or further education programs with increased confidence and success. | |

Name of Resource: _____

Area of Study/Strand: **AGRICULTURE (Draft)**

In this resource, support for the learner expectations outlined is as follows:

| CURRICULUM | RESOURCE CORRELATION |
|---|---|
| **GENERAL LEARNER EXPECTATIONS**<br><br>Students will:<br><br>• develop knowledge of why agriculture is important to everyone<br><br>• develop awareness of crops, animals, environments and ecology in Alberta<br><br>• develop awareness of agriculture production, processing, marketing systems and food channels. | |

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